

VVSG Requirements for Human Factors and Privacy: Where Do We Go From Here?

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Language in HAVA continues to guide our work

- The system must be “accessible for individuals with disabilities, including non-visual accessibility for the blind and visually impaired, in a manner that provides the same opportunity for access and participation (including privacy and independence) as for other voters.” -- 301 (a)(3)(A)
- At least one voting system “equipped for individuals with disabilities” must be used at each polling place for federal elections held on or after January 1, 2006. -- 301 (a)(3)(B).
- And “provide alternative language accessibility as already required by section 203 of the Voting Rights Act.” -- 301 (a)(4).

Resolutions on four key principles also guide the work on accessibility, usability and privacy

- Human factors and privacy rely on both having **well designed systems**, and the effective deployment of those systems **in the polling place** (#3-05)
- Human abilities exist on a wide spectrum. Strong **universal usability** requirements make all voting systems not only **more usable**, but **accessible to more people**. (#6-05)
- Ballot design, instructions and error messages are a **critical** part of the **voting experience**. They are of particular importance for people with cognitive disabilities (#8-05)
- Setting **performance**, rather than design, **standards** will **encourage innovation** to address the complex, interlocking requirements for accessibility, functionality, security and trust. (#5-05)

Five additional resolutions direct our approach to human factors and privacy requirements

- **Accessibility requirements** are a top priority under HAVA (#2-05)
- Other human factors and privacy requirements cover aspects of **accurately capturing indication of a voter's choice** (#4-05)
- **All requirements** involving human interaction must ensure that basic usability, accessibility, and privacy are maintained. (#9-05)
- The **standards** themselves must be **usable**. Voting system standards should be written in **plain language** understandable by both test experts and by voting officials who are not experts in human factors or design. (#10-05)
- Voting machines must be available to validate conformance tests and establish **performance benchmarks**. (#11-05)

Some critical decisions were made in applying the resolutions to the initial VVSG guidelines

- Primary focus on general equipment vs. election specific
- Requirements should be testable
 - Deferred developing conformance tests for equipment
- Performance vs. design guidelines
 - Performance guidelines preferred
- Recognition of environment for deployment of equipment
 - Focus on guidance for ballot design, setup, instructions, etc. in next iteration
- “shoulds” will migrate to “shalls”

VVSG strengthens and further defines the accessibility and usability requirements in VSS 02

- Accessibility updated and enhanced from VSS 2.2.7
- Limited English Proficiency requirements added
- Usability updated and enhanced from VSS 3.4.9, VSS 2.4.3, NASED Technical Guide #1, and Usability Appendix
- Privacy requirements added
- Other elements
 - Recommendation that vendors present report of summative usability tests for both general and accessible voting systems
 - Work to clarify ambiguous requirements and fill gaps
 - Reflect what is readily achievable with current technology
 - Some human factors requirements in section on VVPAT

The outline of VVSG 2.2.7

1. Accessibility

- 1.1 General
- 1.2 Visual
- 1.3 Dexterity
- 1.4 Mobility
- 1.5 Hearing
- 1.6 Speech
- 1.7 Cognitive

2. Alternate languages

3. Usability

- 3.1 Usability testing
- 3.2 Functional
- 3.3 Cognitive
- 3.4 Perceptual
- 3.5 Interaction

4. Privacy

- 4.1 Voting station configuration
- 4.2. Anonymity for alternate
ballot formats

Research is underway to further address resolutions in future VVSG

- Usability performance benchmarks
- Plain language guidance for ballots, instructions, error messages
- Guidance for ballot design
- Guidance for interaction design
- Usability of standards
- Further refinement of accessibility guidelines
- Test methods

Advisory and Standards Boards and advocacy groups have pointed out **additional** issues in draft VVSG

- These deal primarily with accessibility
- Some can be addressed easily
- Some will require thoughtful research on possible solutions and development of a guiding philosophy

The issues in VVSG that are causing debate need to be addressed

- **Should voters be able to connect personal assistive technology?**
- Are the requirements for non-written languages clearly noted?
- Dexterity requirements are not as strong as those for visual disabilities
- Should the low vision requirements be made more stringent?
- Can the requirements for speech in the audio ballot be less production-specific and more quality oriented?
- To what extent should cognitive disabilities be addressed?
- What are the issues surrounding “vote by phone” for those with disabilities?
- How should “best practices for election officials” in using voting systems be communicated?
- “should” vs. “shall”?
- [How do we factor in feasibility and cost?]

Questions and Discussion

Explanatory Material on Issues

Personal Assistive Technology

There are differences in language that reflect two different concepts that need to be resolved.

VSS 2002 2.7.1

“DRE voting systems shall provide, as part of their configuration, the capability to provide access to voters with a broad range of disabilities. This capability shall: (a) Not require, the voter to bring their own assistive technology to a polling place;”

VVSG 2.2.7.1.2

"An Acc-VS shall provide accessibility to voters using their own personal assistive devices"

Sufficiency and Interoperability related but independent

- **Sufficiency:** What access features (unrelated to PAT) must a voting system contain to meet accessibility requirements under the VVSG (and HAVA)?
- **Interoperability:** What features must a voting system provide to allow the Acc-VS to interact with various types of PAT?

Security must be considered in allowing connections for personal assistive technology

- Connection ports, especially standard ports, create a security risk, by opening access to the voting system
- Rehabilitation Act Amendment, Section 508, 1194.25(a) provides a useful definition:

"Self contained products shall be usable by people with disabilities without requiring an end-user to attach assistive technology to the product. Personal headsets for private listening are not assistive technology."

VVSG only includes requirements for an audio jack for personal assistive technology

- 2.2.3.1 The ATI shall provide its audio signal through an industry standard connector for private listening using a 3.5mm stereo headphone jack...

VVSG also has requirements to avoid interference with hearing aids

- 2.2.3.2 When a voting station utilizes a telephone style handset/headset ... it shall provide a wireless T-Coil coupling for assistive hearing devices ...
- 2.2.3.3 No voting station shall cause electromagnetic interference with assistive hearing devices ...

Writing testable standards for comprehensive interoperability is a challenge

- Standard communication protocols
- Standard ports
- Compatible software
- Technical and feasibility issues for implementation
- [and, of course, the security issues]

LEP: Requirements are in terms of voters not languages

- VVSG (2.2.7) 2 Alternative language requirements for Limited English Proficiency added
 - Candidate names displayed or pronounced in English (2.2.7.2.2)
 - Alternative language ballots and instructions (2.2.7.2.1)
 - Audio ballots for illiterate voters (2.2.7.2.4)
- implicitly address unwritten languages

Requirements for dexterity disabilities and blindness are not equal

- Section 2.2.7.1.2.2.5

If the normal procedure is for voters to submit their own ballots, then the Acc-VS **shall** provide features that enable voters who are blind to perform this submission.

- Section 2.2.7.1.3.5

If the normal procedure is for voters to submit their own ballots, then the Acc-VS **should** provide features that enable voters who lack fine motor control or the use of their hands to perform this submission.

Poor reading vision, especially for paper ballots, is not adequately addressed

- 2.2.7.1.2.1.1, 2, and 3 partial vision accessibility
 - 2 font sizes, paper ballot accessibility
- Implies large print ballots?
- What about VVPAT?
- Optical aids not a universal solution as “low vision” covers a wide range of vision problems
- Privacy is an issue as well

Synthesized speech can be described with 3 qualities

- VVSG prefers human recorded speech over synthesized speech, but technology is improving (2.2.7.1.2.2.3.8)
- Quality is the important aspect
 - Clear and intelligible
 - Able to control of rate of speed
 - Candidate's names reproduced as they are normally pronounced

Vote by phone as accessible voting station not researched for current VVSG

- Questions:
 - With print ballot for casting: font size and dexterity issues?
 - Self-contained: dexterity issues, adaptive options?
 - Paper ballots and phone as the 2 options: large size ballots?

Cognitive disabilities are not addressed in detail VVSG (2.2.7.1.7)

- Audio with synchronized video helps those with dyslexia
- Plain language instructions and good design are less confusing for everyone
- For the broad range of cognitive and mental disabilities, it is not clear what additional requirements would be useful and feasible

An “accessible” voting system can be deployed in a way that makes it inaccessible.

- During the drafting of Section 2.2.7., best practices for ensuring that requirements are met in the polling place were included. These are now collected in an appendix.
- How should “best practices for election officials” in using voting systems be communicated?

Late edits to the VVSG, upgraded some requirements from “should” to “shall”

What is the effect?

- 2.2.7.1.2.2.6 Accessibility of VVPAT

- If the normal procedure includes VVPAT, the Acc-VS should provide features that enable voters who are blind to perform this verification.

If a state requires the paper record produced by the VVPAT to be the official ballot, then the Acc-VS shall provide features that enable visually impaired voters to review the paper record.

- But, what is an official ballot? What about recounts?

- 2.2.7.1.2.1.9 Synchronized audio and video displays

- Any voting station using an electronic image display shall provide synchronized audio output to convey the same information as that which would be displayed on the screen.

Late edits to the VVSG, upgraded some requirements from “should” to “shall”

- 2.2.7.1.2.1.5 – Voters can adjust color and contrast (no requirement for poll worker assistance)
 - An Acc-VS with a color electronic image display shall allow the voter to adjust the color or the figure-to-ground ambient contrast ratio.
- 2.2.7.1.2.2.2.5 Audio ballot allows the voter to skip reading referendum text
 - The ATI shall allow the voter to skip over the reading of a referendum so as to be able to vote on it immediately.